



CAB-O-SIL® DIVISION

CABOT CORPORATION

Division File
Subpart F Groundwater Monitoring
04180801 -- Douglas County

P. O. BOX 186, TUSCOLA, ILLINOIS 61953

TELEPHONE AREA CODE 217
TUSCOLA 253-3370
TELEX TUSCOLA 910-083-2542

January 31, 1984

Mr. Mark Haney, Manager
Compliance Sub-Unit
Compliance Monitoring Section
DLPC, Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, IL 62706

Re: 04180801--Douglas County
Tuscola/Cabot Corporation
Subpart F: Groundwater monitoring

Dear Mr. Haney:

Enclosed is a copy of the assessment of semi-annually collected groundwater samples at the above referenced facility. The assessment indicates that the subject impoundment is leaking and may be affecting the quality of groundwater beneath the facility.

Cabot Corporation will provide the Agency Director with a written notice to meet the requirement of Section 725.193(d)(1).

Very truly yours,

Gabriel Paci
Gabriel Paci
CABOT CORPORATION

cc: Hydropoll, Inc.

Encls.

EPA Region 5 Records Ctr.



298864

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FEB 01 1984

~~EPA~~ DLPC
STATE OF ILLINOIS

HYDROPOLL, Inc.

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ASSESSMENT OF SEMI-ANNUALLY
COLLECTED GROUNDWATER SAMPLES
RCRA IMPOUNDMENT
CABOT CORPORATION PLANT
TUSCOLA, ILLINOIS
(U.S. EPA I.D. NO. ILD042075333)

Date: January, 1984

Prepared by: Rauf Piskin, Ph.D., C.P.G.

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~~EPA~~ - ILL. P.C.
STATE OF ILLINOIS

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ASSESSMENT OF SEMI-ANNUALLY COLLECTED GROUNDWATER SAMPLES

Introduction

This semi-annual assessment of the analysis of the groundwater samples collected from monitoring wells for the hazardous waste impoundment at the Cabot plant, Tuscola, Illinois has been prepared in accordance with the IPCB regulations. Reference is made to Part 725, Subpart F: Groundwater Monitoring.

Regulatory Requirements

Section 725.192(d) (2), Subpart F: Groundwater Monitoring, Part 725: Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, of the IPCB regulations, requires that water samples must be collected from the wells in a monitoring system and analyzed for contamination indicator parameters at least semi-annually, subsequent to establishment of the initial background quality (Section 725.192(c)). The indicator parameters of groundwater contamination, as listed in Section 725.192(b) (3), are: pH, Specific conductance, total organic carbon (TOC), and total organic halogen (TOX).

Based on at least four replicate measurements on each semi-annually collected sample, for each well, the arithmetic mean and variance must be calculated for each indicator parameter . These arithmetic means must be compared with their initial background arithmetic means using the Student's t-test at the 0.01 level of significance. The comparison must consider individually each of the wells in the monitoring system.

A single-tailed Student's t-test must be used for specific conductance, TOC and TOX while a two-tailed Student's t-test must be used for pH to test at the 0.01 level of significance for significant increase or decrease, respectively (Appendix IV, 40 CFR Part 265). Statistically significant changes must be determined (Section 725.193(b)). Depending on the outcome of the comparisons, the owner or operator must take the steps indicated in Sections 725.193(c) and (d).

Initial Background

To establish background quality, the water samples were taken from the four monitoring wells near the hazardous waste impoundment on a quarterly basis and analyzed for three sets of parameters (Section 725.192(b)). The results of these analyses, submitted to the IEPA previously, are in Appendix A and summarized in Tables 1 and 2. The background quality has been established for all wells as specified in 725.192(C).

Semi-Annual Sampling and Assessment Method

The semi-annual samples were collected from the four monitoring wells on September 12-13, 1983 and analyzed for the indicator parameters of groundwater contamination. These samples were analyzed also for drinking water parameters and U.S.EPA interim primary drinking water standards (Appendix III, 40 CFR, Part 265). The results of the semi-annual analyses are in Appendix-B. The means for each indicator parameter were calculated. These means were compared with their corresponding initial background means using the Student's t-test at the 0.01 level of significance to determine statistically significant increases, in the case of pH decreases. Each well sampled for the semi-annual assessment considered individually and were compared with the initial background means of the upgradient well (MW-1).

Student's t-Distribution

The value of Student's t-distribution with n-1 degrees of freedom is expressed by the following equations (Alder and Roessler, 1964):

$$t = \frac{\bar{X} - m}{S_x} \quad \text{where,} \quad (1)$$

$$S_x = \frac{s}{\sqrt{n}} \quad (2)$$

t = value of t for n-1 degrees of freedom

\bar{X} = mean of the measurement, it is the mean of the semi-annual analysis in this case,

m = mean of the sample, it is the mean of the background in this case,

s = best estimate of the standard deviation of the sample where $n < 30$, it is the standard deviation calculated for the background in this case,

S_x = best estimate of the standard deviation of the mean of samples,

n = number of variates in a sample, it is 16 in this case,

Vf = degree of freedom; it is n-1 or 15.

Calculation of t Values for Indicator Parameters

Utilizing the above equations, t values are calculated for specific conductance as below:

$$S = 47.53 \text{ (from 2nd column of Table 1)}$$

$$m = 1361 \text{ (from 2nd column of Table 1)}$$

$$S_x = \frac{S}{\sqrt{n}} = \frac{47.53}{\sqrt{16}} = \frac{47.53}{4} = 11.88$$

$$t = \frac{\bar{X} - m}{S_x} = \frac{\bar{X} - 1361}{11.88}$$

Place, \bar{X} , mean conductance values measured semi-annually (Appendix-B) into the above equation and solve for t.

The calculated t values are listed in Table 3. The value of t 0.01 for $V_f = 15$, taken from statistical tables, is included in Table 3. Similarly, t values have been calculated from the equations (1) and (2) for TOC, TOX, and pH. These calculated values and their corresponding t 0.01 values from statistical tables are also shown in Table 3.

Assessment

Comparison of the calculated t values of the indicator parameters of groundwater contamination with the published t values at the 0.01 level of significance indicate that the hazardous waste impoundment is leaking. The waste fluid leaked from the impoundment is contributed to the underlying groundwater.

Only pH shows a significant change at MW-1 (Table 3). The significant decrease of pH in the background well is caused by an outside source located at the west, upgradient from the well. All the indicator parameters change significantly at MW-2 which is the closest to the impoundment and the most useful downgradient monitoring well in the system. Conductance, TOC and TOX increased significantly while pH decreased significantly. The results of comparison at this well led the evaluator to conclude that the impoundment is the primary source of the significant changes in groundwater in the vicinity of the impoundment.

Conductance, and TOX increased and, pH decreased significantly in MW-3 and MW-4. The potentiometric map (Figure 1) indicates that MW-3 could be affected somewhat by the impoundment. However, MW-4 is far from the impoundment and closer to a leachfield which probably affects the quality of water in this well.

The conclusion reached from the statistical analyses above are in agreement with the water level measurements, which shows a groundwater mound and migration of waste fluids from the impoundment.

FOLLOW-UP

Because the semi-annual assessment indicates that the hazardous waste impoundment is leaking, Cabot Corporation will provide a written notice to the Director of the IEPA of the above findings within seven days of this report. Within 15 days after the notification, Cabot Corporation will submit to the Director a certified groundwater quality assessment program at the facility, as required in Section 725.193(d)(2).

Prepared by:

Rauf Piskin

Rauf Piskin, C.P.G. 5090
Hydrogeologist

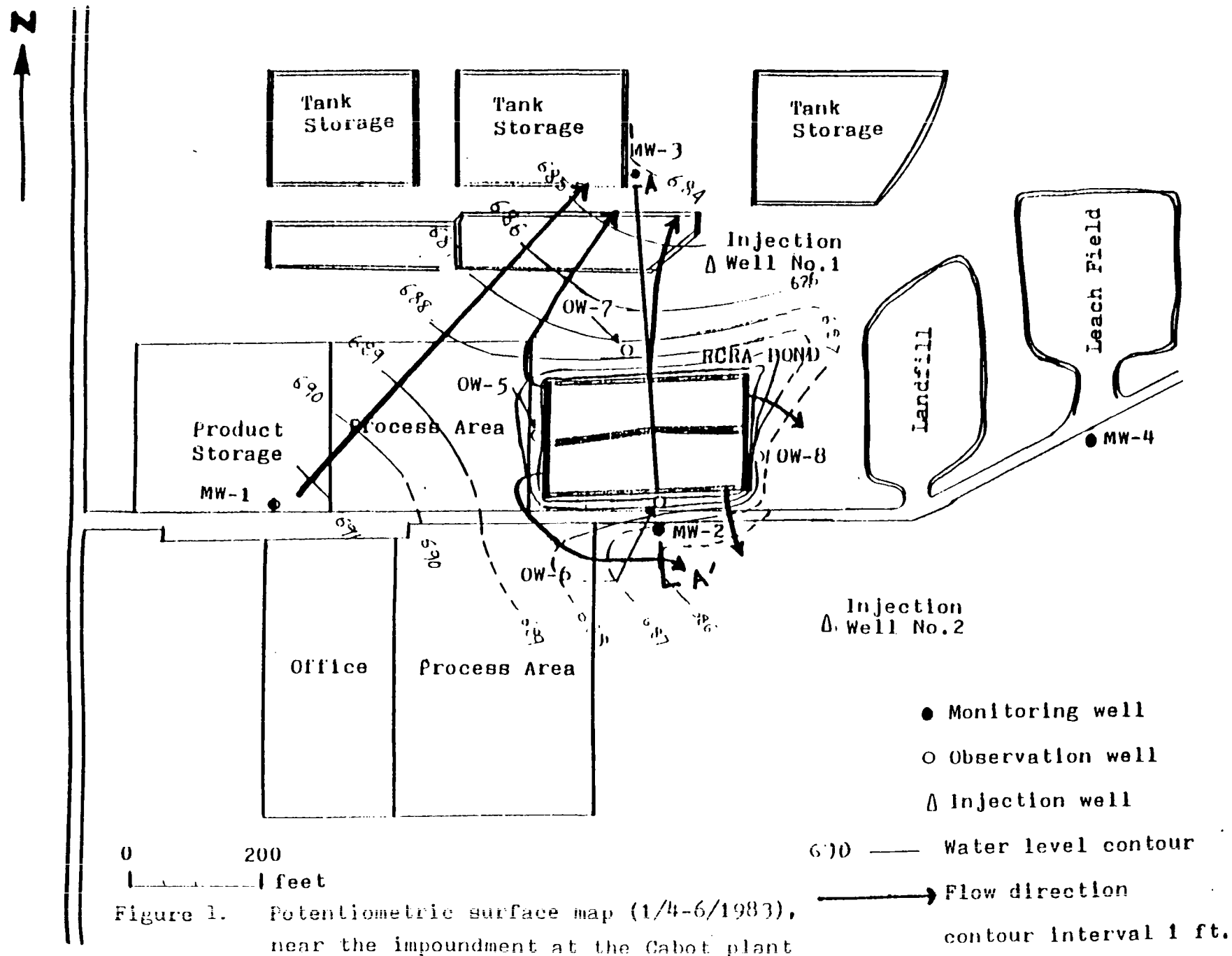


Table 1. Measured values of contamination indicator parameters, and their initial background arithmetic means and variances of the water samples taken quarterly from the up-gradient well, MW-1, at the Cabot plant.

	<u>pH</u>	<u>Conductance, mg/l</u>	<u>TOC, mg/l</u>	<u>POX, mg/l</u>
1st Q	7.44	1360	21	0.08
	7.43	1360	21	0.09
	7.44	1370	21	0.07
	7.45	1370	22	0.06
2nd Q	7.38	1320	12	0.044
	7.36	1330	11	0.047
	7.39	1340	12	0.072
	7.39	1330	11	0.045
3rd Q	7.27	1250	10.0	0.088
	7.26	1330	9.8	0.055
	7.23	1330	8.7	0.034
	7.25	1430	8.3	0.040
4th Q	7.31	1410	14	0.033
	7.26	1410	15	0.025
	7.33	1420	14	0.025
	7.30	1410	13	0.022
Mean, \bar{X}	7.34	1360.62	13.9875	0.051875
Variance	0.0058	2259.58	22.2145	0.0005097
Standard deviation	0.076	47.53	4.71	0.023

Table 2. Measured values of contamination indicator parameters, and their initial background arithmetic means and variances of the water samples taken quarterly from three downgradient wells at the Cabot plant.

<u>Parameter</u>		<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
pH, unit	1st Q	4.42	6.45	6.27
	2nd Q	4.21	6.21	6.46
	3rd Q	3.95	6.04	6.24
	4th Q	3.79	6.01	6.27
	Mean,	4.09	6.18	6.31
	Variance,	0.0776	0.0408	0.0102
Conductivity, ymhos/cm	1st Q	74,600	15,700	12,000
	2nd Q	66,500	17,400	12,000
	3rd Q	68,400	18,500	13,100
	4th Q	68,700	18,400	14,500
	Mean,	69,550	17,500	12,900
	Variance,	1.23×10^6	1.69×10^6	1.41×10^6
TOC, mg/l	1st Q	187	26	27
	2nd Q	119	19	11
	3rd Q	185	35	31
	4th Q	137	14	11
	Mean,	157	23.5	20
	Variance,	1176	83.00	110.67
TOX, mg/l	1st Q	4.3	0.61	0.35
	2nd Q	2.500	0.480	0.260
	3rd Q	3.750	0.300	0.290
	4th Q	2.200	0.250	0.240
	Mean,	3.188	0.410	0.285
	Variance	1.001	0.023	0.0023

Table 3. Calculated t values for indicator parameters of groundwater contamination, and comparison with their t 0.01 values published, for the semi-annual assessment of the groundwater quality of the Cabot plant, Tuscola, Illinois

Monitoring Well No.	Conductance		TOC		TOX		pH	
	Calculated (t)	t0.01= 2.602	Calculated (t)	t0.01= 2.602	Calculated (t)	t=0.01 2.602	Calculated (t)	t0.01=2.947
MW-1	-3.45		-8.72		-1.39		-9.47	Decrease
MW-2	4835	Increase	88.99	Increase	912.7	Increase	-187.9	Decrease
MW-3	1426	Increase	-7.70		60.5	Increase	-68.95	Decrease
MW-4	1350	Increase	-6.26		260.5	Increase	-55.26	Decrease

LIST OF REFERENCES

Alder, H.L. and E.B. Roesler. 1964. Introduction to probability and statistics (Third Edition). 313 p. W.H. Freeman and Company

Cabot plant files

APPENDIX-A: Quarterly monitoring data for background

RCRA GROUNDWATER MONITORING

Phase I

August, 1982

JPrueitt
27 Oct. 82

TABLE 1
FIELD DATA

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Total Well Depth (ft)	31.3	31.4	29.8	30.5
Standing Water Depth (ft)	25.9	24.2	23.1	23.4
Standing Water Volume (Gal.)	4.2	4	3.8	3.8
Well Volumes pumped prior to sample collection	3.5	2.8	3.9	2.4
Date sampled	8/17/82	8/17/82	8/18/82	8/18/82
Time	11:00 am	2:00 pm	10:00 pm	1:00 pm

TABLE 2

DRINKING WATER PARAMETERS

		<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Arsenic	(mg/l)	0.051	0.077	0.043	0.006
Barium	"	0.12	1.8	1.0	0.44
Cadmium	"	<0.01	0.07	0.02	0.01
Chromium	"	<0.01	0.04	0.02	0.02
Lead	"	0.08	0.43	0.22	0.19
Mercury	"	<0.0001	0.0003	<0.0002	<0.0002
Selenium	"	0.007	0.004	0.001	0.001
Silver	"	<0.01	0.09	0.02	0.02
Fluoride	(mg/l)	0.4/0.4	<0.1	<0.1	<0.1/ 0.1
Nitrate	(mg/l)	0.54/0.52	8.50	1.00	0.75
Endrin	(ppb)	< 0.02	<0.02	<0.02	<0.02
Lindane	(ppb)	< 0.4	<0.4	<0.4	<0.4
Methoxychlor	(ppb)	<10	<10	<10	<10
Toxaphene	(ppb)	< 0.5	<0.5	<0.5	<0.5
2, 4-D	(ppb)	< 1	<1	<1	<1
Silvex	(ppb)	< 0.5	<0.5	<0.5	<0.5
Gross Alpha	(pCi/l)	14.8	32.0	31.8	10.3
Gross Beta	(pCi/l)	12.7	266.1	21.7	<2
Radium	(pCi/l)	< 2	0.7	0.8	<2
Turbidity	(N.T.U.)	132/133	17/17	0.2/0.2	0.3/0.4
Total Coliform	(#/100ml)	0	0	0	3

TABLE 3

GROUNDWATER QUALITY PARAMETERS

		<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Chloride	(mg/l)	162/162	37,900/37,700	5,970/5,930	5,900/6,000
Iron	(mg/l)	6.4	<u>560</u>	0.12	0.59
Manganese	(mg/l)	1.1	<u>160</u>	11	0.92
Phenols	(µg/l)	1.0	<u>8.0</u>	3.0	4.0/4.0
Sodium	(mg/l)	30	320	320	220
Sulfate	(mg/l)	208/208	10/10	79/81	99/97

TABLE 4

CONTAMINATION INDICATOR PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
<u>pH</u>	7.44	4.42	6.45	6.27
	7.43	4.43	6.46	6.26
	7.44			
	<u>7.45</u>			
Mean	7.44			
Std. Deviation	0.01			
<u>Specific Conductance</u> (μ mhos/cm)	1360	74,600	15,700	12,000
	1360			
	1370			
	<u>1370</u>			
Mean	1365			
Std. Deviation	5			
<u>Total Organic Carbon</u> (mg/l)	21	187	26	27
	21	193	24	25
	21			
	<u>22</u>			
Mean	21.3			
Std. Deviation	0.6			
<u>Total Organic Halogen</u> (mg/l)	0.08	4.3	0.61	0.35
	0.09	3.6	0.66	0.39
	0.07			
	<u>0.06</u>			
Mean	0.08			
Std. Deviation	0.01			

CABOT CORPORATION
FACILITY USEPA I.D. NO. ILD042075333

RCRA GROUNDWATER MONITORING
QUARTERLY SAMPLING
NOVEMBER, 1982

Table 1

FIELD DATA

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Total Well Depth (ft.)	31.3	31.4	29.8	30.5
Standing Water Depth (ft.)	26.2 5.1	24.1 7.3	23.1 6.7	24.0 6.5
Standing Water Volume (gal.)	4.3	3.9	3.8	3.9
Well Volumes Pumped Prior to Sample Collection	3.1	2.3*	3.7	3.8
Date Sampled	11/16/82	11/17/82	11/17/82	11/17/82
Time	11:00 AM	8:30 AM	11:30 AM	2:00 PM

*Well pumped to complete dryness on 11/16/82 then
allowed to refill prior to sampling the following day.

Table 2

DRINKING WATER PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Arsenic (mg/l)	0.06	0.09	0.03	0.02
Barium (mg/l)	0.14	1.4	1.3	0.51
Cadmium (mg/l)	<0.01	0.09	0.02	0.02
Chromium (mg/l)	0.04	0.13	0.03	0.04
Lead (mg/l)	0.07	1.3	0.36	0.31
Mercury (mg/l)	<0.0001	<0.0001	<0.0001	<0.0001
Selenium (mg/l)	0.006	0.001	0.005	0.001
Silver (mg/l)	<0.01	0.08	0.03	0.02
Fluoride (mg/l)	0.4	<0.1	<0.1	<0.1
Nitrate (mg/l)	0.57	6.7	0.35	0.20
Endrin (ppb)	<0.02	<0.02	<0.02	<0.02
Lindane (ppb)	<0.4	<0.4	<0.4	<0.4
Methoxychlor (ppb)	<10	<10	<10	<10
Toxaphene (ppb)	<0.5	<0.5	<0.5	<0.5
2,4-D (ppb)	<2	<2	<2	<2
Silvex (ppb)	<1	<1	<1	<1
Gross Alpha pCi/l	35.5	226.4	55.5	15.9
Gross Beta pCi/l	87.7	549.3	111.6	19.5
Radium pCi/l	1.3	1.7	<2	2.0
Turbidity (N.T.U)	72	19	0.3	45
Total Coliform (#/100 ml)	0	0	0	0

Table 3

GROUNDWATER QUALITY PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Chloride (mg/l)	144	35,000	6,478	4,022
Iron (mg/l)	23	510	0.15	2.5
Manganese (mg/l)	1.4	150	19	1.3
Phenols (μ g/l)	1.6	7.6	1.2	0.8
Sodium (mg/l)	27	200	320	210
Sulfate (mg/l)	252	<1	78	96

Table 4

CONTAMINATION INDICATOR PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
<u>pH</u>	7.38	4.21	6.21	6.46
	7.36			
	7.39			
	7.39			
Mean	7.38			
Std. Deviation	0.01			
<u>Conductivity</u>	1,320	66,500	17,400	12,000
(µmhos/cm)	1,330			
	1,340			
	1,330			
Mean	1,330			
Std. Deviation	13			
<u>Total Organic Carbon</u>	12	119	19	11
(mg/l)	11			
	12			
	11			
Mean	11.5			
Std. Deviation	0.8			
<u>Total Organic Halogen</u>	.044	2.500	0.480	0.260
(mg/l)	.047			
	.072			
	.045			
Mean	.052			
Std. Deviation	.013			

CABOT CORPORATION
FACILITY USEPA I.D. NO. ILD042075333

RCRA GROUNDWATER MONITORING
QUARTERLY SAMPLING

FEBRUARY, 1983

Table 1

FIELD DATA

	<u>MW-1M</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Total Well Depth (ft.)	31.3	31.4	29.8	30.5
Standing Water Depth (ft.)	25.6	24.6	23.1	24.3
Standing Water Volume (gal.)	4.2	4.0	3.8	4.0
Well Volumes Pumped Prior to Sample Collection	4.7	2.3*	4.9	5.6
Date Sampled	2/23/83	2/24/83	2/23/83	2/24/83
Time	10:30 AM	8:30 AM	3:15 PM	11:45 AM

*Well pumped to complete dryness on 2/23/83 then allowed
to refill prior to sample collection on 2/24/83.

Table 2

DRINKING WATER PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Arsenic (mg/l)	0.05	0.08	0.02	0.02
Barium (mg/l)	<0.10	7.2	1.8	1.4
Cadmium (mg/l)	0.01	0.09	0.02	0.02
Chromium (mg/l)	0.01	0.22	0.02	0.02
Lead (mg/l)	0.03	1.1	0.26	0.25
Mercury (mg/l)	<0.0001	0.0003	0.0004	<0.0001
Selenium (mg/l)	0.003	<0.001	0.005	0.012
Silver (mg/l)	<0.01	0.12	0.03	0.03
Fluoride (mg/l)	0.3	<0.1	<0.1	<0.1
Nitrate (mg/l)	0.3	8.2	0.3	0.2
Endrin (ppb)	<0.02	<0.02	<0.02	<0.02
Lindane (ppb)	<0.4	<0.4	<0.4	<0.4
Methoxychlor (ppb)	<10	<10	<10	<10
Toxaphene (ppb)	<0.5	<0.5	<0.5	<0.5
2,4-D (ppb)	<2	<2	<2	<2
Silvex (ppb)	<1	<1	<1	<1
Gross Alpha (pCi/l)	6.0	10.5	<5	<5
Gross Beta (pCi/l)	<4	17.6	<8	<8
Turbidity (N.T.U)	67	58	0.3	60
Total Coliform (#/100 ml)	0	0	0	0

Table 3

GROUNDWATER QUALITY PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Chloride (mg/l)	154	34,100	6900	4730
Iron (mg/l)	2.9	640	0.16	4.8
Manganese (mg/l)	0.43	140	46	1.7
Phenols (µg/l)	5.0	8.4	2.0	1.2
Sodium (mg/l)	24	170	280	180
Sulfate (mg/l)	250	<1	74	84

Table 4

CONTAMINATION INDICATOR PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
<u>pH</u>	7.27	3.95	6.04	6.24
	7.26			
	7.23			
	7.25			
Mean	7.25			
Std. Deviation	0.02			
<u>Conductivity</u>	1,250	68,400	18,500	13,100
(µmhos/cm)	1,330			
	1,330			
	1,430			
Mean	1,340			
Std. Deviation	74			
<u>Total Organic Carbon</u>	10.0	185	35	31
(mg/l)	9.8			
	8.7			
	8.3			
Mean	9.2			
Std. Deviation	0.9			
<u>Total Organic Halogen</u>	0.088	3.750	0.300	0.290
(mg/l)	0.055			
	0.034			
	0.040			
Mean	0.054			
Std. Deviation	0.025			

CABOT CORPORATION

FACILITY USEPA I.D. NO. ILD042075333

RCRA GROUNDWATER MONITORING

QUARTERLY SAMPLING

MAY, 1983

TABLE 1

FIELD DATA

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Total Well Depth (ft.)	31.3	31.4	29.8	30.5
Standing Water Depth (ft.)	26.1	24.2	23.4	24.3
Standing Water Volume (gal.)	4.3	4.0	3.8	4.0
Well Volumes Pumped Prior to Sample Collection	2.8	5.4	4.1	2.9
Date Sampled	5/10/83	5/10/83	5/11/83	5/11/83
Time	10:00 am	3:30 pm	9:45 am	11:30 am

TABLE 2

DRINKING WATER PARAMETERS

		<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Arsenic	(mg/l)	0.03	0.07	0.01	0.01
Barium	"	0.11	4.4	1.4	0.73
Cadmium	"	< 0.01	0.10	0.02	0.02
Chromium	"	0.01	0.19	0.03	0.04
Lead	"	0.05	1.1	0.34	0.33
Mercury	"	0.0004	0.0006	0.0009	0.0005
Selenium	"	0.007	0.001	0.008	0.010
Silver	"	< 0.01	0.09	0.04	0.03
Fluoride	"	0.30	< 0.1	< 0.1	< 0.1
Nitrate	"	0.46	5.8	0.64	0.27
Endrin	(ppb)	< 0.02	< 0.02	< 0.02	< 0.02
Lindane	(ppb)	< 0.4	< 0.4	< 0.4	< 0.4
Methoxychlor	(ppb)	< 10	< 10	< 10	< 10
Toxaphene	(ppb)	< 0.5	< 0.5	< 0.5	< 0.5
2,4-D	(ppb)	< 2	< 2	< 2	< 2
Silvex	(ppb)	< 1	< 1	< 1	< 1
Gross Alpha	(pCi/l)	12.3	135	16.6	< 3
Gross Beta	(pCi/l)	31.7	144	27.2	< 3
Radium	(pCi/l)	< 3	51.4	11.1	--
Turbidity (N.T.U.)		64	29	0.3	16
Total Coliform (#/100ml)		0	0	0	0

TABLE 3

GROUNDWATER QUALITY PARAMETERS

		<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
Chloride	(mg/l)	162	33,600	5,530	5,490
Iron	(mg/l)	3.8	540	1.0	2.9
Manganese	(mg/l)	0.77	140	32	1.9
Phenols	(ug/l)	1.0	6.5	<1	<1
Sodium	(mg/l)	22	170	260	190
Sulfate	(mg/l)	225	<1	63	107

TABLE 4

CONTAMINATION INDICATOR PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>
<u>pH</u>	7.31	3.79	6.01	6.27
	7.26			
	7.33			
	<u>7.30</u>			
Mean	7.30			
Std. Deviation	0.03			
<u>Conductivity</u>	1410	68,700	18,400	14,500
(μ mhos/cm)	1410			
	1420			
	<u>1410</u>			
Mean	1413			
Std. Deviation	5			
<u>Total Organic Carbon</u>	14	137	14	11
(mg/l)	15			
	14			
	<u>13</u>			
Mean	14			
Std. Deviation	0.8			
<u>Total Organic Halogen</u>	0.033	2.200	0.250	0.240
(mg/l)	0.025			
	0.025			
	<u>0.022</u>			
Mean	0.026			
Std. Deviation	0.005			

APPENDIX-B: Semi-annual Monitoring Data

CABOT CORPORATION

FACILITY US EPA I.D. No. ILD042075333

RCRA GROUNDWATER MONITORING

SEPTEMBER, 1983 SAMPLING

TABLE 1

	<u>Field Data</u>							
	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>	<u>OW-5</u>	<u>OW-6</u>	<u>OW-7</u>	<u>OW-8</u>
Total Well Depth (ft)	31.3	31.4	29.8	30.5	29.8	30.2	30.2	30.0
Standing Water Level (ft)	28.7	27.3	25.4	26.0	25.1	28.0	26.4	27.0
Standing Water Volume (gal)	4.7	3.9	4.2	4.3	4.1	4.6	4.3	4.4
Well Volumes Pumped Prior to Sample Collection	3.3*	1.2*	2.6	2.5	2.9	2.3	2.9	2.7
Date Sampled 1983	9/13	9/13	9/12	9/12	9/13	9/13	9/13	9/13
Time	8:30 A.M.	9:00 A.M.	1:20 P.M.	2:50 A.M.	11:45 A.M.	10:30 A.M.	2:00 P.M.	3:25 P.M.
Elevation of Water Level (ft)	690.84	686.58	682.5	686.37	685.55	687.86	686.24	687.35

*Well pumped to complete dryness and allowed to refill prior to sample collection.

TABLE 2
DRINKING WATER PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>	<u>OW-5</u>	<u>OW-6</u>	<u>OW-7</u>	<u>OW-8</u>
Arsenic (mg/l)	0.017	0.040	0.017	0.011	0.023	0.117	0.026	0.029
Barium (mg/l)	0.08	5.3	1.8	1.3	4.0	0.57	3.3	0.89
Cadmium (mg/l)	<0.01	0.07	0.02	0.02	0.03	0.02	0.03	0.02
Chromium (mg/l)	<0.01	0.40	0.04	0.05	0.07	3.2	0.08	5.6
Lead (mg/l)	0.04	1.1	0.35	0.36	0.72	1.4	0.78	0.78
Mercury (mg/l)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0017	<0.0001	0.0031
Selenium (mg/l)	<0.001	0.026	0.019	0.025	0.055	0.029	0.046	0.095
Silver (mg/l)	<0.01	0.07	0.02	0.03	0.05	0.04	0.06	0.04
Fluoride (mg/l)	0.22	20	<0.10	<0.10	0.16	59	0.19	43
Nitrate (mg/l)	0.05	5.0	0.80	0.48	0.38	2.7	0.50	2.0
Endrin (ppb)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lindane (ppb)	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Methoxychlor (ppb)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toxaphene (ppb)	<10	<10	<10	<10	<10	<10	<10	<10
2, 4-D (ppb)	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Silver (ppb)	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Gross Alpha (pCi/l)	4.6	293	55	77	318	866	206	588
Gross Beta (pCi/l)	<10	641	62	103	134	975	113	973
Radium (pCi/l)	NA	37.8	<10	<10	3.5	83.2	9.4	24.2
Turbidity (N.T.U.)	6.7	370	0.18	29	270	1.5	95	1.2
Total Coliform (#/100 ml)	0	0	0	0	0	0	0	0

TABLE 3

GROUNDWATER QUALITY PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>	<u>OW-5</u>	<u>OW-6</u>	<u>OW-7</u>	<u>OW-8</u>
Chloride (mg/l)	159	25,900	6,830	6,180	18,900	25,400	19,400	24,700
Iron (mg/l)	0.37	640	0.44	4.5	150	2,400	30	3,800
Manganese (mg/l)	0.34	110	27	3.1	55	22	74	31
Phenols (μ g/l)	1.6	8.4	1.6	2.0	7.6	4.0	2.8	8.6
Sodium (mg/l)	26	170	320	250	85	110	130	85
Sulfate (mg/l)	292	<1	64	118	62	356	76	104

TABLE 4

CONTAMINATION INDICATOR PARAMETERS

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>MW-4</u>	<u>OW-5</u>	<u>OW-6</u>	<u>OW-7</u>	<u>OW-8</u>
<u>pH</u>	7.15	3.77	6.03	6.29	5.93	0.81	6.00	1.96
	7.16							
	7.15							
	7.16							
Mean	7.16							
Std. Deviation	0.006							
<u>Conductivity</u> (μ mhos/cm)	1300	58800	18300	17400	23100	102100	46300	46300
	1300							
	1340							
	1340							
Mean	1320							
Std. Deviation	23							
<u>Total Organic Carbon</u> (mg/l)	4.0	119	4.9	6.6	27	191	38	175
	3.2							
	3.6							
	3.8							
Mean	3.7							
Std. Deviation	0.34							
<u>Total Organic Halogen</u> (mg/l)	0.046	5.300	0.400	7.300*	3.900	29.000	2.900	1.400
	0.046							
	0.038							
	0.044							
Mean	0.044							
Std. Deviation	0.004							

* It appears that this result is erroneous. Later, two samples collected on 12-2-83, indicated that concentration was between 0.410 and 0.370 mg/L. These values are in agreement with the background concentration.